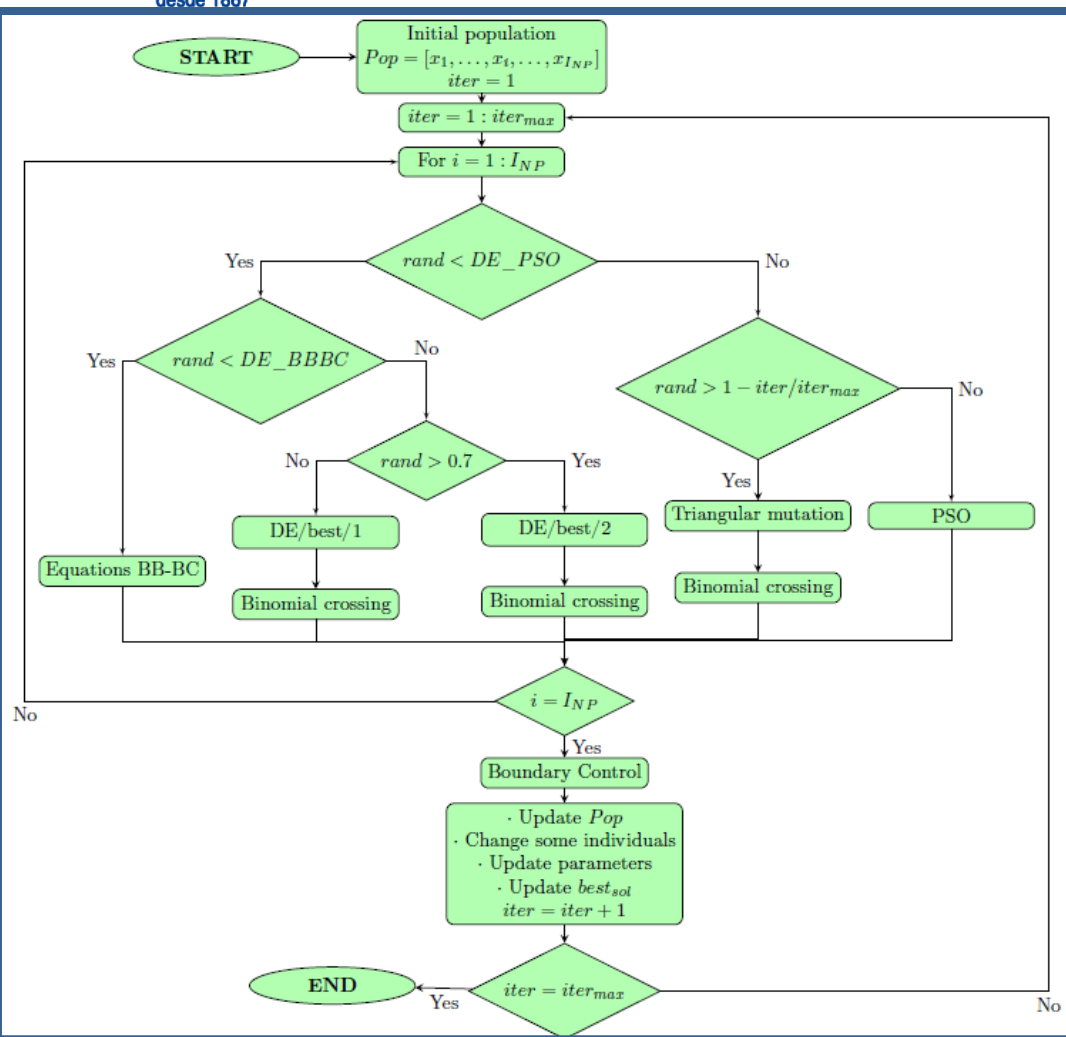


ALGORITHM:

Combination of Differential Evolution, Particle Swarm Optimization and Big Bang-Big Crunch (DE-PSO-BBBC)

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DE-PSO-BBBC:

- It is a combination of Differential Evolution (DE), Particle Swarm Optimization (PSO) and Big Bang-Big Crunch (BB-BC).
- This combination aims to perform a more efficient search and thus cover certain disadvantages of each metaheuristic.

Fig 1: Flowchart of the DE-PSO-BBBC.



function DE-PSO-BBBC

Input

Pop: initial population

c1, *c2*, *NR*, *w_{max}*, *w_{min}*, *I_{max}_{PSO}*: PSO (parameters).

I_{max}_{BB-BC}: BB-BC (parameter).

minP, *maxP*: search limits.

DE_PSO: probability of using DE or PSO.

DE_BBBC: probability of using DE or BB-BC.

iter = 1.

Output *best_{sol}*.

While *iter* < *iter_{max}* **do**

for *i* = 1: *I_{NP}* **do**

if *rand* < *DE_PSO* **do**

if *rand* < *DE_BBBC* **do**

 Equation BB-BC (*Ind_{new}*)

else

if *rand* > 0.7 **do**

DE/*best*/2

 Apply binomial crossing (*Ind_{new}*)

else

DE/*best*/1

 Apply binomial crossing (*Ind_{new}*)

end if

end if

else

if *rand* > 1 - *iter*/*iter_{max}* **do**

 Triangular mutation

 Apply binomial crossing (*Ind_{new}*)

else

 Apply PSO (*Ind_{new}*)

end if

end if

end for

 Update *Pop* (Apply selection (DE)).

 Strategies to change some individuals (based on previous solutions).

 Update PSO and BB-BC parameters.

 Update *best_{sol}* (the best solution of *Pop*).

iter = *iter* + 1

end while

end function

General considerations :

- The parameters of the PSO and BB-BC are initialized after a certain number of iterations (to avoid premature convergence).
- Three different differential mutations can be used.
- Parameters of the DE decrease in function of the iterations number.
- Some individuals are replaced for individuals generated before iterations (maintain diversity).

Fig 2: Pseudocode of the DE-PSO-BBC.